OUTLINE SHEET 4-8-1
Planned Maintenance System

A. Introduction

The maintenance of shipboard equipment must be done correctly and promptly at all times. This lesson covers the skills and knowledge required to perform basic maintenance tasks.

B. Enabling Objectives

4.22 **STATE** the purpose of the maintenance and material management system.

4.23 **DESCRIBE** the contents of the Planned Maintenance System master file.

4.24 **STATE** the parts and their functions of the workcenter PMS manual.

4.25 **VERIFY** a maintenance requirement card.

C. Topic Outline

1. Introduction
2. Overview
3. Maintenance Data System
4. Planned Maintenance System
5. PMS Master File
6. Maintenance Requirement Card
7. PMS Schedule
8. PMS Spot Check
9. Summary and Review
10. Assignment

ASSIGNMENT SHEET 4-8-2
Planned Maintenance System

A. Introduction

This material is to be completed prior to the material being covered in class.

B. Enabling Objectives

Refer to enabling objectives in Outline Sheet 4-8-1.

C. Study Assignment

1. Read Information Sheet 4-8-3

D. Study Questions

1. What is used to inform a maintenance person of all the maintenance actions assigned to him/her for the week?
2. What is the purpose of a PMS spot check?
3. What are you going to do if you failed to understand the steps required in an MRC?

INFORMATION SHEET 4-8-3
Planned Maintenance System

A. Introduction

This information describes the Maintenance and Material Management System.

B. Reference

OPNAVINST 4790.4C 3-M Manual

C. Information

I. The Maintenance and Material Management (3-M) System is used for managing maintenance aboard all ships and applicable shore station equipment. The objectives of 3-M are:
   A. Standardization - achieve uniform maintenance standards and criteria.
   B. Efficiency - effective use of available manpower and material resources.
   C. Documentation - recording of maintenance and maintenance support efforts.
   D. Analysis - used to improve the maintainability and reliability of a system or equipment.
   E. Configuration status accounting - used to report and record changes in the installation, specification and location of equipment onboard ships.
   F. Scheduling - used to plan and track maintenance required and accomplished.

II. The Maintenance Data System is used to report maintenance requirements and configuration changes. MDS is used to:
   A. help determine the material condition of the ship.
   B. generate maintenance request for outside activities.
   C. plan and report maintenance requirements and material procurement.
   D. report configuration changes in installed equipment.

III. The objective of the ship's Planned Maintenance System (PMS) is to maintain equipment within specifications through:
   A. preventive maintenance.
   B. identification and correction of potential problems.

IV. PMS provides:
- A. procedures for planned maintenance of systems and equipment.
- B. minimum requirements for planned maintenance. Minimum requirements mean:
  1. all the necessary or required maintenance that must be accomplished on each equipment.
  2. how often these maintenance actions must be accomplished.
- C. schedules and control of maintenance tasks.
- D. Description of the methods, materials, tools, and personnel needed for the task.
- E. prevention or detection of hidden failures or malfunctions.
- F. test procedures to determine material or equipment readiness.

V. The PMS Master File contains maintenance requirements information that pertains to all equipment of a command. It includes supplementary information such as the 3-M Manual and various updates and reports.
- A. The Workcenter PMS Manual (43P1) is the portion of a PMS Master File that contains the planned maintenance requirements for a particular workcenter.
- B. It is designed to provide a ready reference of planned maintenance requirements for the workcenter supervisor. It contains:
- C. LOEP (List of Effective Pages) - Provides a listing of all the Maintenance Index Pages (MIPs) applicable to a particular workcenter.
  1. It serves as a “Table of Contents” for the Workcenter PMS Manual.
  2. Each line item on this list is assigned SYSCOM MIP Control Number, which is the same number found at the bottom right corner of the corresponding Maintenance Index Page (MIP).
- D. MIP (Maintenance Index Page) - Contains a listing of all maintenance requirements for a specific or similar equipment/system.
  1. Each equipment or system category has its own specific MIP and each MIP is designated by a number called the SYSCOM MIP Control Number.
  2. The MIP also provides a brief description of each maintenance requirement.
  3. Each maintenance requirement listed on the MIP is assigned a SYSCOM MRC Control Number, which should match the number of the corresponding MRC (Maintenance Requirement Card).
- E. The Maintenance Requirement Card (MRC) provides detailed

procedures for performing maintenance.

1. It describes who, what, how, and with what resources a specific requirement will be accomplished.
2. The MRC contains the following information and instructions:

    a) Ship System, System, Subsystem, Equipment. These blocks identify the specific system, or equipment involved.
    b) MRC Code - This block contains the MIP series code and the maintenance requirement periodicity code. Periodicity means how often must a specific maintenance requirement is performed.
        (1) Examples of periodicity codes: D - Daily; 2D - Every 2nd day; W - Weekly; M - Monthly; Q - Quarterly; S - Semi-annually; A - Annually; 8M - Every 8th month; 18M - Every 18th month
        (2) When more than one maintenance requirements of the same periodicity exists in the same MRC set, the MRCs in most cases will be numbered consecutively, e.g., “D-1, “D-2”, “D-3”, or “M-1”, “M-2”, etc.
    c) Maintenance Requirement Description -Brief description of the PMS action to be done.
    d) Rate - This identifies the recommended skill level of the person(s) considered capable of performing the maintenance requirements.
        (1) Qualified personnel other than the rate/rating specified may be assigned.
        (2) When a Navy Enlisted Classification (NEC) Code is assigned, substitution of other personnel is not allowed.
    e) Man-hours (M/H) - The average time per equipment required to perform the maintenance.
    f) Safety Precautions - This is a listing of those precautions and references which direct attention to possible hazards to personnel and equipment while doing the maintenance.
    g) Tools, Parts, Materials, Test Equipment - This block lists the tools, parts, materials and test equipment necessary to perform the maintenance. Standard maintenance items can be referenced to the Standard PMS Materials Identification Guide (SPMIG).

    h) Procedure -This block details the sequence of steps

to be followed in performing the maintenance action. Reference to other approved procedures may be included in the MRC.

i) Safety precautions will be listed prior to applicable steps and/or procedural action. Specific categories are:

(1) **Warning** - Death or injury may result if the operating/handling procedures and practices are not correctly followed.
(2) **Caution** - Damage to equipment may result if the operating procedures and practices are not correctly followed.
(3) **Note** - This word will precede procedural advisories. It is used to alert personnel of essential information, project a final result, or highlight a particular condition.

j) Location - This block contains the specific location or EGL, or other authorized check-off lists that detail equipment location.

k) Date - This block contains the month and year when the MRC was prepared.

l) SYSCOM MRC Control Number - This block contains the code used in cataloging MRCs.
(1) This set of numbers is located vertically along the lower right side of the MRC.
(2) This number should match the corresponding MRC number on the MIP.

3. MRCs are normally laminated to minimize soiling, and wear and tear.

4. When an MRC applies to a number of identical items, an Equipment Guide List (EGL) is attached to the MRC.
a) The time required to complete all maintenance listed on the EGL should be no more than a single day's work.
b) When more than one EGLs are filled for one particular MRC, EGL cards are kept in a separate holder located close to the MRC deck.

5. The Tag Guide List (TGL) or a locally prepared-equivalent contains the information necessary for equipment tag-out incidental to PMS accomplishment.
a) The TGL contains the number of tags required, location of tags, position of tagged item (open, shut, off, on, etc.), and permission or notification requirements.
b) TGLs are locally prepared and are kept in a binder or

holder located near the MRC deck.

VI. PMS schedules are categorized as cycle, quarterly, and weekly schedules.

A. The **Cycle PMS schedule** displays the planned maintenance requirements to be performed during the period between major overhauls of the ship. The cycle schedule is divided into quarters.

B. The **Quarterly PMS schedule** displays the workcenter's PMS requirements to be performed during a specific 3-month period corresponding to that particular quarter on the cycle schedule. The quarterly schedule is divided into weeks.

C. The **Weekly PMS schedule** displays the workcenter's planned maintenance requirements scheduled for accomplishment during the week.

1. This schedule is laminated so that it can be cleaned and updated each week.
2. The maintenance requirements and the names of the individuals assigned to perform the PMS are written with a china marker or "grease" pencil.
3. Every Monday, the weekly schedule is updated by the Workcenter Supervisor and signed by the Division Officer.
4. Maintenance personnel obtain PMS assignments from the weekly schedule and report fully accomplished and non-accomplished maintenance actions to the Workcenter Supervisor.
5. When satisfied that the work has been fully accomplished, the Workcenter Supervisor will "X" off the maintenance requirement on the weekly schedule. If not fully accomplished, the maintenance is circled and re-scheduled.

VII. Maintenance personnel are responsible to the Workcenter Supervisor.

A. New personnel are normally required to qualify as 3-M Maintenance Person within 6 months upon reporting on board.

B. When performing maintenance, the maintenance person must promptly notify the Workcenter Supervisor when:

1. Anything on an MRC is not fully understood, appears to be incorrect or cannot be accomplished as written.
2. Tools, materials, etc., prescribed by the MRC are not available.
3. Any doubt exists about capability, training, or experience to properly perform the MR as prescribed.
4. Factors exist which would make performance of the maintenance requirement unwise or dangerous.
5. Equipment deficiencies or casualties are discovered.

VIII. Individual maintenance requirements are spot checked periodically in

order to determine the effectiveness of PMS accomplishment.

A. Once a week, maintenance requirements that have been X'd off as being fully accomplished are selected at random to be spot checked by any one from the following list:
   1. Group Supervisor
   2. Division Officer
   3. Department Head
   4. 3-M Coordinator
   5. Executive Officer
   6. Commanding Officer

B. During the spot check, the maintenance person must be able to describe or demonstrate all or some of the maintenance procedures of the MR. The maintenance person must also be able to demonstrate knowledge of how to verify the MRC.
   1. MRC verification is a very important step that must be done before conducting the maintenance to ensure that the correct and most up-to-date MRC is used.
   2. This is accomplished by making sure that the card's SYSCOM NO. matches the MRC number on the MIP, and the MIP's SYSCOM NO. matches the MIP number on the LOEP.

C. If the assessor is completely satisfied that the MR was correctly performed, the MR will be graded as "Fully Accomplished".

D. A grade of "Not Accomplished" or "Gundecked" maybe given if:
   1. the maintenance person cannot demonstrate general familiarity with the procedure.
   2. there is no evidence that the work was ever done.
   3. tag-out was not accomplished as applicable.

E. Gundecking of PMS adversely affects readiness of the Engineering Department in the accomplishment of its missions.

F. Gundecking is punishable under the UCMJ.

DIAGRAM SHEET 4-8-4

List of Effective Pages (LOEP)

OPNAVINST 4790.4C
7 November 1994

Date: 08/23/94 Planned Maintenance System Page: 1
Time: 14:37:51 List of Effective Pages (PMS 5) FR: 2-94

Unit: DDG 0053 UIC: R21313 Work Center: EA01 USS JOHN PAUL JONES

Adds/ Changes	MIP	Nomenclature
	1631/004-A2	SEA CHESTS
-	2560/006-24	CRCLT AND COOLING SW SYS
	4431/002-63	VISUAL/AUDIO COMM SYSTEMS
	5000/005-A2	VALVES & VALVE OPERATORS
	5000/007-82	ENG REPAIR PROCEDURES
	5140/011-C3	AIR CONDTN SYSTEM (R-114)
-	5161/001-C3	REFRD, SHIP SERVICE (R-12)
	5312/002-32	DISTILLING PLANT VPR CPRSN
	5331/002-33	WATER, POTABLE SERVICE
	5332/001-C0	DISTILLED WATER SERVICE
-	5511/010-44	AIR SYSTEM, HIGH PRESSURE
-	5515/009-44	COMPRESSORS, AIR
	5600/016-44	SHIP CONTROL SYSTEMS
	5713/006-B1	RAS TRANSFER HEAD & SLIDING
	5721/009-31	SHIPS STORES HDLG EQPT
-	5811/020-44	ANCHOR HANDLING & STOWAGE
-	5821/016-44	MOORING AND TOWING SYSTEM
-	5831/013-93	BOAT HANDLING & STOWAGE
-	5832/005-24	LIFE SAVING EQUIP PRESV
-	5833/047-83	SMALL BOATS {ENGINE (CUMN)}
-	5833/201-24	SMALL BOATS (EQUIPMENT)
-	5833/202-24	SMALL BOATS (STEERING SYS)
	5833/309-83	SMALL BOATS (WILLARDRIB)
	5931/016-43	SEW/WST WTR POLL CONT SYS
-	6300/001-44	PRESERVATION & COVERINGS
-	6331/002-44	ZINCS (SACRIFICIAL ANODES)
-	6512/002-34	DISHWASHING MACHINE

DIAGRAM SHEET 4-8-5A
Maintenance Index Page (1 of 3)

SHIP SYSTEM, SYSTEM, SUBSYSTEM, OR EQUIPMENT	REFERENCE PUBLICATIONS	DATE
Fuel Service System Level 4 - Equipment Test 2610		May 1996

CONFIGURATION

Incorporates ESWBS Systems:
2611 Piping and Miscellaneous, Fuel Service
2612 Pumps, Fuel Service
2613 Purifiers, Fuel Service

TEST	OTHER	SYSCOM MRC CONTROL NO.	MAINTENANCE REQUIREMENT DESCRIPTION	PERIO-DICITY CODE	RATES	MAN HOURS	RELATED MAINT-ENANCE
			Scheduling Aids: 1. MRCs 36M-4R and R-2 contain blank spaces to be filled in by ship's force before implementation. Until these "fill-in" data elements are applied, maintenance requirements cannot be effectively accomplished. Advise via PMS feedback report if required "fill-in" data is not available to ship's force. 2. Review MRCs S-2, S-5, S-6. Omitt maintenance requirement(s) if not applicable; no feedback report required. 3. Accomplish MRC M-7R if NAVIFLASH, fuel flash point tester has been installed. 4. Review MR M-2. Omit maintenance requirement if Integrated Condition Assessment System (ICAS) is not installed; no feedback report required. # Mandatory scheduling required. ** For scheduling purposes only; no MRC is provided.				
		82 W64H N	1. Lubricate prefilter latch pins.	M-1	FN	0.1	None
			1. Conduct vibration survey. **NOTE:** Accomplish 2020/001; MRC-1	M-2 **		0.5	None
4		45 C2HY N	1. Test fuel flash point. **NOTE:** Accomplish monthly and anytime ship receives new fuel.	M-7R	ABF/EN GSM/ MM2	0.5	None
			1. Test automatic drain valve.	S-9	GSE2 GSM2	0.5 0.5	None
4		A2 W64K N	1. Test electrical valve operator and valves.	Q-2	GSM3 GSE3 2FN	0.5 0.5 1.0	None
		82 W64L N	1. Inspect fuel oil flange safety shields.	Q-3	GSM2	0.5	None
		44 C1QG N	1. Clean and inspect fuel oil purifier suction strainer.	Q-7	GSM3	0.2	None

DIAGRAM SHEET 4-8-5B
Maintenance Index Page (2 of 3)

TEST	OTHER	SYSCOM MRC CONTROL NO.	MAINTENANCE REQUIREMENT DESCRIPTION	PERIO-DICITY CODE	RATES	MAN HOURS	RELATED MAINT-ENANCE
4		56 Z57T N	1. Test main fuel oil booster pump logic sequencing. 2. Test pump fault circuitry.	S-4	GSM1 GSM2	0.5 0.5	None
		82 W64S N	1. Lubricate fuel oil booster pump bearings.	S-5	GSM3	0.3	None
		82 W64T N	1. Lubricate quick closing valve housing bearings.	S-6	GSM3	0.1	S-2
4		57 A7GW N	1. Test automatic drain valve	S-9	GSE2 GSM2	0.5 0.5	None
		44 W64Y N	1. Inspect pump mounting foundation fasteners and resilient mounts.	A-3	GSM3	0.1	None
		82 W65A N	1. Inspect fuel oil booster pump bonding/ ground strap	A-5	GSM3	0.1	None
		82 W65B N	1. Inspect resiliently mounted pipe hangars. **NOTE:** Accomplish annually and after rework to the piping system.	A-6R	GSE3	0.1	None
		44 W65C Y	1. Replace prefilter elements. **NOTE:** Accomplish annually or when any of the following conditions exist: (1) Prefilter differential pressure exceeds 25 psi. (2) Remote dirty filter element alarm sounds.	A-7R	GSM3 GSMFN	1.5 1.5	None
		A2 W64J N	1. Inspect fuel oil relief valve.	A-12	GSM3	0.1	None
4		45 B9KR N	1. Test fuel oil relief valve. **NOTE:** Accomplish every 36 months, after overhaul/ repair of valve, or when irregularities are suspected.	36M-4R	GSM3	0.3	None
4		45 W65F N	1. Renew filter/separator coalescer cartridges. 2. Clean and inspect separator element. 3. Test water high-level alarm. **NOTE:** Accomplish when differential pressure across filter/separator exceeds 25 psi or as indicated by CHANGE ELEMENT light, whichever occurs first.	R-2	GSM2 FN	4.0 4.0	R-3#
4		96 W65G N	1. Test operate filter/separator. **NOTE:** Accomplish when maintenance requirement R-2 has been performed or when discrepancies are suspected, whichever occurs first.	R-3	GSM3	0.2	None
		82 W65J N	1. Inspect fuel oil booster pump mechanical seal for leak. **NOTE:** Accomplish each time pump is placed in operation.	R-6	GSM3	0.1	None
4		82 W65K N	1. Drain prefilter sludge sump. **NOTE:** When in operation, perform daily.	R-8D	FN	0.1	None

DIAGRAM SHEET 4-8-5C
Maintenance Index Page (3 of 3)

TEST	OTHER	SYSCOM MRC CONTROL NO.	MAINTENANCE REQUIREMENT DESCRIPTION	PERIO-DICITY CODE	RATES	MAN HOURS	RELATED MAINT-ENANCE
		32 X72H N	1. Clean, inspect, and lubricate purifier bowl. **NOTE:** Accomplish every 4000 hours of operation.	R-12	GSM1 GSM3	2.0 2.0	None
			INACTIVE EQUIPMENT MAINTENANCE The following requirements will be scheduled when equipment is inactive for periods of prolonged idleness.				
			Lay-Up Maintenance				
		82 W65P N	1. Drain prefilter. **NOTE:** Accomplish before entering an industrial environment.	LU-1	FN	0.2	None
		43 W65Q N	1. Drain filter/separator. **NOTE:** Accomplish before entering an industrial environment.	LU-2	FN	0.2	None
			1. Provide approved fire retardant protective cover for fuel oil pump motor. **NOTE:** Accomplish as required to protect equipment.	LU-3 * *			
			Periodic Maintenance				
			None				
			Start-Up Maintenance				
		82 W65R N	1. Fill and vent prefilter. **NOTE:** Accomplish when ship has been in an industrial environment.	SU-1	FN	0.1	None
		82 W65S N	1. Fill and vent filter/separator. **NOTE:** Accomplish when ship has been in an industrial environment.	SU-2	FN	0.1	None
			1. Remove protective cover from fuel oil pump motor. **NOTE:** Accomplish if required.				
			1. Lubricate quick closing valve housing bearings. **NOTE:** Use MRC S-6, if applicable.				
			1. Clean, inspect, and lubricate quick closing valve operating gear assembly. **NOTE:** Use MRC S-2, if applicable.				
			Operational Test				
			1. Test operation of fuel oil quick closing valve and operating assembly. **NOTE:** Use MRC R-7, if applicable.				

MAINTENANCE INDEX PAGE (MIP) PAGE 3 OF 3 SYSCOM MIP CONTROL NUMBER 2610/005-56
OPNAV 4790/85 (REV. 2-82)

DIAGRAM SHEET 4-8-6A
Maintenance Requirement Card (Page 1 of 2)

SHIP SYSTEM	SUBSYSTEM	MRC CODE
Propulsiom Support Systems (Fuel and Lube Oil) 260	Piping and Miscellaneous, Fuel Service 2611	2610 S-9

SYSTEM	EQUIPMENT	RATES	M/H
Fuel Service System 261	Automatic Drain Valve 2611V6	GSE2 GSM2	0.5 0.5

TOTAL M/H 1.0
ELASPED TIME 0.5

MAINTENANCE REQUIREMENT DESCRIPTION
1. Test automatic drain valve.

SAFETY PRECAUTIONS
1. Forces afloat comply with NAVOSH Program Manual for Forces Afloat, OPNAVINST 5100.19 series.
2. Voltage dangerous to life exists when equipment is open and energized. Do not work alone.

TOOLS, PARTS, MATERIALS, EQUIPMENT

MATERIALS
1. [0878] Matting, floor
2. [0750] Lead set, test 17-component

MISCELLANEOUS
1. [0527] Gloves, electrical workers, 17000 volt maximum safe use, size 9, rubber

NOTE: Numbers in brackets can be referenced to Standard PMS Materials Identification Guide (SPMIG) for stock number identification.

PROCEDURE

Preliminary
a. Ensure filter/separator is in operation.

NOTE: Fuel oil filter/separator must be pressurized for drain valve to open. If filter/separator is secured, start filter/separator IAW current operating procedures.

1. **Test Automatic drain valve.**

WARNING: Voltage dangerous to life exists when equipment is open and energized. Do not work alone.

a. Disconnect left and right hand tower water level probes.
b. Interconnect left hand tower water probe pins C and B.

PAGE 1 OF 2

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LOCATION	DATE
Equipment Guide List Recommended	May 1987

MAINTENANCE REQUIREMENT CARD (MRC)
OPNAV 4790 (REV. 2-82)

DIAGRAM SHEET 4-8-6B
Maintenance Requirement Card (Page 2 of 2)

PROCEDURE (Contd)

c. Verify that left hand tower drain valve is open by fuel flowing through drain line sightglass.
d. Shift to right tower.
e. Interconnect right hand tower water probe pins C and B.
f. Verify that right hand tower drain valve is open by fuel flowing through drain line sightglass.
g. Reconnect left and right hand tower water level probes.
h. Stop filter/separator if not needed for service.
i. Return equipment to readiness condition.

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LOCATION	DATE
Equipment Guide List Recommended	May 1987

MAINTENANCE REQUIREMENT CARD (MRC)
OPNAV 4790 (REV. 2-82)

OUTLINE SHEET 4-9-1